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Calvin C. Elgot*
1922–1980

Calvin C. Elgot, one of the original members of the editorial board of this journal, and well known for his many contributions to computer science, died on July 8, 1980. He was born in New York City in 1922. After serving in the United States Army during the second world war, he took a B.S. degree in Mathematics at City College of New York in 1948 and an A.M. at Columbia University in 1951 while holding a lectureship there. He then took a position as mathematician in the computer science department at the U.S. Naval Ordnance Laboratory, Silver Spring, Maryland. In 1954–1955, he returned to graduate study as a Teaching Assistant at Berkeley, and from 1955–1959 as a Research Mathematician at the University of Michigan at Ann Arbor where he received a doctorate in 1960. In 1959, he joined the IBM Thomas J. Watson Research Center in Yorktown Heights, New York, where he served as a Research Staff Member until his untimely death. During this period he also held visiting professorships at the Universities of Paris, Bristol, Columbia, Yale, and the Stevens Institute of Technology.

Elgot's work was primarily on the theory of computation, and he was involved in it at the beginning of its rapid growth period. His first paper [1] appeared in the first volume of the *Journal of the Association of Computing Machinery* in 1954. Characteristically, this was a proof that for certain precisely defined simplified types of machine, the storage requirements for arithmetic operations of a single-address machine were not more than those of a triple-address machine. For the next ten years, he worked mainly in the area where automata theory and logic meet. He used results from logic to prove the undecidability of decision problems for finite automata and was one of the first to apply automata theory to logic. For example, in the noteworthy [11], he proved the decidability of various weak second order arithmetics.

The well-known paper [17] with Abraham Robinson treated very successfully the problem of giving a mathematical model not, like Turing, of the simplest conceivable computing machine, but of machines with all the facilities, such as random access and stored program, of modern computers. This model was extended in [24] to include parallel processing. Elgot's paper [25], which was not as well known as it deserved to be, was one of the first papers to consider algorithms operating on arbitrary data structures. It developed the analogue for such structures of the basic theorems of recursive function theory. It was also more general than similar later treatments in considering basic commands which were combinations of operations and multi-exit tests, rather than the more usual division into operations and binary tests.

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The book "Recursiveness" (1970) [29], co-authored with S. Eilenberg, was a masterly presentation of recursive function theory in an algebraic setting, the key notion being their use of the category whose morphisms are functions $N^r \to N^s$, allowing functions of any number of arguments and values to be treated uniformly. From then on, Elgot was convinced that the best way to understand the theory of computation was to express it as far as possible in algebraic, especially category-theoretic, terms. He had always had a taste for, and skill in, algebra (e.g., [9, 10]). He was a pioneer in introducing into the theory of computation the idea of algebraic theories and, later iterative theories (cf. [32, 34–36]). As well as these contributions to the semantics of monadic computation, he obtained results on its syntax, in the form of flowchart schemes. In [37], he showed that by working with multi-entrance, multi-exit schemes a few simple operations sufficed to build up all schemes. Classes of schemes defined by subsets of these operations were studied in detail from both a graph-theoretic and algebraic point of view [37, 42, 44, 50].

Elgot was always sensitive to the need to bridge the gap between those with training in pure mathematics and those who came to the theory of computation from its practice. His own work was characterised by the utmost precision of definition and meticulous proof. Just prior to his death he was working actively on several different projects. It is sad that he did not live to complete them and to see the further impact of his work.

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